New Bag and Size Limit Analysis Methodology

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Introduction

- Designed for specific circumstances
  - Bag limit increases
  - Minimum size limit decreases
- Problem: When increasing a bag limit or decreasing a size limit, how many fish do we add to the landings?
- Need to know how many discarded fish are above the size limit (current or proposed).

Data for Example

- Use Black Sea Bass as an example
- Assessment data from 2013 Update
- Recreational trip level data
  - 2013-2014
  - MRIP intercept data
  - Headboat data from SRHS
- Data ranges from Cape Hatteras, NC to the Miami-Dade/Monroe County line.
- Bag limits examined ranged from 5-10 per person and size limits from 13” down to 11”.
- Current conditions were 5 fish per person at 13”.

Assumptions

- Trips that DID NOT reach the bag limit
  - All discards (Disc) were below the current size limit
- Trips that DID reach the bag limit
  - Some Disc are below the current size limit
  - Some Disc are above the current size limit (due to bag limit)
- Size limits below the current
  - All trips have Disc both above and below the new size limit

Basic Method

- Need size comp of discards
  - Terminal year abundance at age
  - Disc selectivity at age for fish above and below size lim
- Calculate proportion of Disc above size lim
  - 12” < Disc < 13” = % Disc > 12” - % Disc > 13”
- Current size limit (13”)
  - Disc on trips reach bag * % Disc > 13”
- Lower size limit (12”)
  - 12” < Disc < 13”: Disc all trips * 12” < % Disc < 13”
  - Disc > 13”: Disc on trips reach bag * % Disc > 13”

Discard Selectivity

- Discard selectivity at age calculation
  - Use von Bert length at age
  - Assume Normal dist with mean = von Bert length and CV from assessment
  - Calculate prob being above/below size lim at age
- For Black Sea Bass
  - Assumed full sel at age 3 in Update
  - Est. sel of ages 0-2 from Update
  - Set Disc Sel < lowest size lim of ages 0-3 = Update est.
- 12” < Disc Sel < 13” = Disc Sel > 12” – Disc Sel > 13”

Discard Selectivity (BSB)

Age	Sel x<11	Sel 11<x<12	Sel 12<x<13	Sel x>13
0	Update Est.	0	0	0
1	Update Est.	0	0	0
2	Update Est.	0	0	0
3	1	0	0	0
4	N(vB, CV)<11	N(vB, CV)>11 - N(vB, CV)>12	N(vB, CV)>12 - N(vB, CV)>13	N(vB, CV)>13
5	N(vB, CV)<11	N(vB, CV)>11 - N(vB, CV)>12	N(vB, CV)>12 - N(vB, CV)>13	N(vB, CV)>13
6	N(vB, CV)<11	N(vB, CV)>11 - N(vB, CV)>12	N(vB, CV)>12 - N(vB, CV)>13	N(vB, CV)>13
7	N(vB, CV)<11	N(vB, CV)>11 - N(vB, CV)>12	N(vB, CV)>12 - N(vB, CV)>13	N(vB, CV)>13
8	N(vB, CV)<11	N(vB, CV)>11 - N(vB, CV)>12	N(vB, CV)>12 - N(vB, CV)>13	N(vB, CV)>13
9	N(vB, CV)<11	N(vB, CV)>11 - N(vB, CV)>12	N(vB, CV)>12 - N(vB, CV)>13	N(vB, CV)>13
10	N(vB, CV)<11	N(vB, CV)>11 - N(vB, CV)>12	N(vB, CV)>12 - N(vB, CV)>13	N(vB, CV)>13
11	N(vB, CV)<11	N(vB, CV)>11 - N(vB, CV)>12	N(vB, CV)>12 - N(vB, CV)>13	N(vB, CV)>13

Discard Proportions

- Terminal abundance at age * Disc Sel = Discards at age
- Calc for each size lim
- For Black Sea Bass
  - 2012 abundance at age
  - Disc<11”, 11”<Disc<12”, 12”<Disc<13”, Disc>13”
- Sum to get total discards
- Calc proportion of discards at each size lim
- Proportions used to calc num disc add to landings
  - Size limited is lowered
  - Bag limit is raised

Black Sea Bass Selectivities

Age	Discard Selectivity				2012 Abundance (num)
	<11	11<x<12	12<x<13	>13	
0	0.0015	0	0	0	33,042,170
1	0.088	0	0	0	13,459,560
2	0.599	0	0	0	8,842,770
3	1	0	0	0	4,277,590
4	0.487664	0.035131	0.034955	0.004631	1,542,900
5	0.447384	0.031327	0.031459	0.005129	516,580
6	0.41989	0.028533	0.028803	0.005474	145,210
7	0.400282	0.026461	0.026795	0.005722	33,720
8	0.385827	0.024896	0.025261	0.005906	8,310
9	0.374896	0.023695	0.024075	0.006045	3,840
10	0.366464	0.022759	0.023145	0.006153	1,490
11	0.35986	0.022021	0.02241	0.006238	900
Total					61,875,040

Black Sea Bass Discards

Age	2012 Discards				
	<11	11<x<12	12<x<13	>13	Total
0	49,563	0	0	0	49,563
1	1,184,441	0	0	0	1,184,441
2	5,296,819	0	0	0	5,296,819
3	4,277,590	0	0	0	4,277,590
4	752,417	54,204	53,932	7,145	867,699
5	231,110	16,183	16,251	2,650	266,193
6	60,972	4,143	4,182	795	70,093
7	13,498	892	904	193	15,486
8	3,206	207	210	49	3,672
9	1,440	91	92	23	1,646
10	546	34	34	9	624
11	324	20	20	6	369
Total	11,871,926	75,774	75,626	10,869	12,034,197

Black Sea Bass Proportions

Age	Proportion Discards at Age			
	<11	11<x<12	12<x<13	>13
0	1	0	0	0
1	1	0	0	0
2	1	0	0	0
3	1	0	0	0
4	0.867141	0.062469	0.062155	0.008234
5	0.868203	0.060794	0.06105	0.009954
6	0.869877	0.059112	0.05967	0.011341
7	0.871582	0.057616	0.058343	0.012459
8	0.87313	0.05634	0.057166	0.013365
9	0.874473	0.05527	0.056156	0.014101
10	0.875616	0.054379	0.055303	0.014702
11	0.876578	0.05364	0.054588	0.015195
Total	0.986516	**0.006297**	**0.006284**	**0.000903**